assembly mounted to reciprocate within said cylinder assembly, said cylinder assembly having at least one working surface and said component assembly having at least one second working surface such that said working surfaces in operation are approximately parallel and co-axial and variably spaced, said surfaces partly defining at least one fluid working chamber varying in capacity during an operating cycle of said device, each of said surfaces being of endless wave-like configuration to permit and limit said component assembly and said second surface to both reciprocate and rotate relative to said cylinder assembly and said first surface, (said mechanism causing said shaft to only rotate while said component assembly reciprocates and rotates.) said device including structure which defines a volume substantially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device.

509. *(Once amended) A (rotatable shaft, a mechanism and) device for the working of fluids, said device comprising a housing with a cylinder assembly mounted therein, at least one component mounted to reciprocate within said cylinder assembly, said cylinder assembly having at least one working surface and said component having at least one second working surface such that said working surfaces in operation are approximately parallel and co-axial and variably spaced, said surfaces partly defining at least one fluid working chamber varying in capacity during an operating cycle of said device, means deployed between said cylinder assembly and said component to cause said component and said second surface to rotate while reciprocating relative to said cylinder assembly and said first surface, (said mechanism causing said shaft to only rotate while said component assembly reciprocates and rotates,) said housing including substantial insulating material(.) for purpose of reducing heat loss from said fluid working chamber.*

*Please **amend** the following dependent claims:*

394. *A compound engine comprising the engine of claim 392, at least one other engine of another type, and a (special) second means for transferring work between each of said at least two engines.*

395. *The compound engine of claim 394, wherein said (special) second means include the flow of heated gases.*

398. *The engine of claim 392, wherein said component assembly defines a passage for fluids worked by said (device) engine.*

399. *The (engine) device of claim (392) 390, (including structure which defines a volume at least partially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device) wherein said component assembly defines a passage for fluids worked by said device.*

401. *The engine of claim (399) 392, including filamentary material within said volume.*

404. *The device of claim 390, including insulating material at least partially encasing said device, for purpose of reducing heat loss from said fluid working chamber.*

405. *The engine of claim 392, including insulating material at least partially encasing said engine, for purpose of reducing heat loss from said fluid working chamber.*

408. *The device of claim 390, wherein said component assembly has a first distinct surface and said cylinder assembly a second distinct surface, in operation said distinct surfaces being approximately constantly spaced from and approximately parallel to one another, at least one of said distinct surfaces defining at least one manufactured depression in operation wholly fillable by fluids worked by said device.*

417. *The rotatable shaft, mechanism and device of claim (390) 552, in which said mechanism comprises a series of splines slidably mounted on another series of splines.*

418. *The rotatable shaft, mechanism and device of claim (390) 552 including rollers, in which said mechanism comprises a series of flanges slidably mounted on another series of flanges, said two series of flanges being separated by said rollers.*

419. *The rotatable shaft, mechanism and device of claim (390) 552, wherein said mechanism comprises at least one bellows.*

420. *The rotatable shaft, mechanism and device of claim (390) 552, wherein said mechanism comprises at least one hinged element.*

427. *The engine of claim 393, wherein said housing comprises insulating material for purpose of reducing heat loss from said fluid working chamber.*

429. *The device of claim 390, wherein said component assembly has a projecting portion which at least partly penetrates (said segment) portion of said cylinder assembly during at least part of said cycle.*

430. *The engine of claim 392, wherein said component assembly has a projecting portion which at least partly penetrates (said segment) portion of said cylinder assembly during at least part of said cycle.*

433. *A compound engine comprising the engine of claim 432, at least one other engine of another type, and a (special) second means for transferring work between each of said at least two engines.*

434. *The compound engine of claim 433, wherein said (special) second means include the flow of heated gases.*

436. *The device of claim 431, including structure which defines a volume (at least partially) substantially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device.*

438. *The engine of claim 432, including structure which defines a volume (at least partially) substantially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device.*

443. *The device of claim 431, including insulating material at least partially encasing said device, for purpose of reducing heat loss from said fluid working chamber.*

444. *The engine of claim 432, including insulating material at least partially encasing said engine, for purpose of reducing heat loss from said fluid working chamber.*

447. *The device of claim 431, wherein said component assembly has a first distinct surface and said cylinder assembly a second distinct surface, in operation said distinct surfaces being approximately constantly spaced from and approximately parallel to one another, at least one of said distinct surfaces defining at least one manufactured depression in operation wholly fillable by fluids worked by said device.*

466. *The device of claim 431, wherein said housing comprises insulating material for purpose of reducing heat loss from said fluid working chamber.*

467. *The engine of claim 432, wherein said housing comprises insulating material for purpose of reducing heat loss from said fluid working chamber.*

469. *The device of claim 431, wherein said component assembly has a projecting portion which at least partly penetrates (said segment) portion of said cylinder assembly during at least part of said cycle.*

470. *The engine of claim 432, wherein said component assembly has a projecting portion which at least partly penetrates (said segment) portion of said cylinder assembly during at least part of said cycle.*

475. *A compound engine comprising the engine of claim 473, at least one other engine of another type, and a (special) second means for transferring work between each of said at least two engines.*

476. *The compound engine of claim 475, wherein said (special) second means include the flow of heated gases.*

480. *The (engine) device of claim 471, (including structure which defines a volume at least partially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device.)*

481. *The engine of claim (480) 479, including filamentary material within said passage.*

482. *The engine of claim (480) 473, including filamentary material within said volume.*

485. *The device of claim 471, including insulating material at least partially encasing said device for*

purpose of reducing heat loss from said fluid working chamber.

489. *The device of claim 471, wherein said component assembly has a first distinct surface and said cylinder assembly a second distinct surface, in operation said distinct surfaces being approximately constantly spaced from and approximately parallel to one another, at least one of said distinct surfaces defining at least one manufactured depression in operation wholly fillable by fluids worked by said device.*

494. *Deleted.*

498. *The rotatable shaft, mechanism and device of claim (471) 553, in which said mechanism comprises a series of splines slidably mounted on another series of splines.*

499. *The rotatable shaft, mechanism and device of claim (471) 553 including rollers, in which said mechanism comprises a series of flanges slidably mounted on another series of flanges, said two series of flanges being separated by said rollers.*

500. *The rotatable shaft, mechanism and device of claim (471) 553, wherein said mechanism comprises at least one bellows.*

501. *The rotatable shaft, mechanism and device of claim (471) 553, wherein said mechanism comprises at least one hinged element.*

504. *The device of claim 472, wherein said housing comprises insulating material for purpose of reducing heat loss from said fluid working chamber.*

505. *The engine of claim 474, wherein said housing comprises insulating material for purpose of reducing heat loss from said fluid working chamber.*

507. *The device of claim 471, wherein said component assembly has a projecting portion which at least partly penetrates (said segment) portion of said cylinder assembly during at least part of said cycle.*

508. *The engine of claim 473, wherein said component assembly has a projecting portion which at least partly penetrates (said segment) portion of said cylinder assembly during at least part of said cycle.*

513. *A compound engine comprising the engine of claim 511, at least one other engine of another type, and a (special) second means for transferring work between each of said at least two engines.*

514. *The compound engine of claim 513, wherein said (special) second means include the flow of heated gases.*

516. *The device of claim 509, including structure which defines a volume (at least partially) substantially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids*

worked by said device.

518. *The engine of claim 511, including structure which defines a volume (at least partially) substantially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device.*

523. *The (device) engine of claim (509) 511, including secondary insulating material at least partially encasing said device for purpose of reducing heat loss from said fluid working chamber.*

527. *The device of claim 509, wherein said component assembly has a first distinct surface and said cylinder assembly a second distinct surface, in operation said distinct surfaces being approximately constantly spaced from and approximately parallel to one another, at least one of said distinct surfaces defining at least one manufactured depression in operation wholly fillable by fluids worked by said device.*

532. *The engine of claim (511) 512, wherein said cylinder assembly is formed at least in part of ceramic material.*

536. *The rotatable shaft, mechanism and device of claim (509) 554, in which said mechanism comprises a series of splines slidably mounted on another series of splines.*

537. *The rotatable shaft, mechanism and device of claim (509) 554 including rollers, in which said mechanism comprises a series of flanges slidably mounted on another series of flanges, said two series of flanges being separated by said rollers.*

538. *The rotatable shaft, mechanism and device of claim (509) 554, wherein said mechanism comprises at least one bellows.*

539. *The rotatable shaft, mechanism and device of claim (509) 554, wherein said mechanism comprises at least one hinged element.*

546. *The (device) engine of claim (510) 473, wherein said housing comprises insulating material for purpose of reducing heat loss from said fluid working chamber.*

547. *The engine of claim 512, (wherein said housing comprises insulating material.) including secondary insulating material at least partially encasing said device for purpose of reducing heat loss from said fluid working chamber.*

549. *The device of claim 509, wherein said component assembly has a projecting portion which at least partly penetrates (said segment) portion of said cylinder assembly during at least part of said cycle.*

550. *The engine of claim 511, wherein said component assembly has a projecting portion which at least partly penetrates (said segment) portion of said cylinder assembly during at least part of said cycle.*

*Please **add** the following dependent claims:*

551. The engine of claim 511, including structure which defines a volume substantially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device.

552 The device of claim 390 including a mechanism and a rotatable shaft, said shaft linked to said component assembly by said mechanism such that said shaft only rotates while said component assembly reciprocates and rotates.

553 The device of claim 471 including a mechanism and a rotatable shaft, said shaft linked to said component assembly by said mechanism such that said shaft only rotates while said component assembly reciprocates and rotates.

554 The device of claim 509 including a mechanism and a rotatable shaft, said shaft linked to said component assembly by said mechanism such that said shaft only rotates while said component assembly reciprocates and rotates.

REMARKS:

Re-examination of this application and reconsideration of the rejection of the claims thereof are respectfully are respectfully requested under the provisions of Rule 112 for the reasons set forth below.

Claim Rejections - 35 USC # 112

In original claims 395 and others reference was made to a "special" means to distinguish from the means recited in the main claims on which they depended. Claims 394, 395, 433, 434, 475, 476, 513 and 514 have all been amended to refer to a "second" means.

Claims 429, 430, 469, 470, 507, 508, 549 and 550 have all been amended to read on the main claims as currently before the examiner.

Claims 494, 546 and 547 are amended. Claim 523 is retained, because it provides for separate insulation, in addition to that of the housing.

The disclosure describes broad new approaches to building pumps and reciprocating engines and discloses many novel features, as well as known features that can unexpectedly and non-obviously be combined with the novel features. The specification clearly states that "the different concepts in this disclosure can be combined in any way. . . . " (see p 47 ln 19 - p 48 ln 21. See also p 3 ln 1 - end; p25 ln 16 - p 26 ln 16; p 27 27 - p 28 ln 1). The examiner and others have commented on the length of the disclosure; it would be at least ten times longer if every viable combination of features were described in text and figures.

In the attached schedule of modified claims annotated to include text and figure references for each claim, it can be seen that there is a proper disclosure for each claim, and that it is clear to someone skilled in the art that the individual features disclosed in text and figures can be combined as provided for in the specification and claimed herein.

It is respectfully submitted that all the enabling requirements of 35 USC # 112, second paragraph, have been met and that all the rejections under this heading are herewith traversed.

Claim Rejections - 35 USC # 102(b)

Claims 390, 408, 411, 412, 421, 422, 425 are rejected as anticipated by Dreisbach.

It is respectfully submitted that Dreisbach's disclosure does not read on claim 390 or any of the other main claims, which all recite a piston reciprocating and rotating. Dreisbach discloses only a piston reciprocating in a cylinder, prevented from rotating by means of guides in slots (see p 1 ln 110 - p 2 ln 5). The amendment to claim 390 further distinguishes over Dreisbach by reciting a volume surrounding the cylinder for passage of fluids worked by the device (as distinct from fluids not worked by the device and used for cooling). The remaining claims are dependent on claim 390 and accordingly lack the teaching of the citations.

Claim 408 was not intended to read on piston ring groves, and has been further modified to distinguish from these. Claim 411 refers to an element "pre-loaded under tension". It is not clear that Dreisbach's screws 46 are loaded in tension and how they hold the main elements of his pistons (items 44, 45 and 47) together. Dreisbach does not show any of these components pre-loaded in tension. In fact, in operation of his device, the components would be principally loaded in tension. The present disclosure clearly teaches how the key components are held together by elements pre-loaded in tension.

Claims 390, 397, 428 are rejected as anticipated by MacKirdy.

It is respectfully submitted that MacKirdy did not read on claim 390 before amendment. Claim 390 did recite a mechanism mounted between piston and rotatable shaft which causes the shaft to only rotate while the piston both reciprocate and rotates. He shows no mechanism between piston and rotatable to convert combined motion into rotational motion. (His shaft is bolted to the piston, so both reciprocates and rotates.) He does not read on newly amended claim 390, since he does not show a cylinder assembly mounted in a housing, nor does he show, nor is there any hint in his disclosure that such features may be relevant to his concepts. The remaining claims are dependent on claim 390 and accordingly lack the teaching of the citations.

Claims 471, 477, 502, 506 are rejected as anticipated by Boyd.

Claim 471 recites a cylinder assembly mounted in a housing. Boyd does not mention a cylinder assembly mounted in a housing. Claim 471 has been amended to further distinguish over Boyd, by reciting. a volume for passage of working fluids substantially surrounding the cylinder assembly. Boyd located his shaft and

mechanism within the area defined by the fluid processing volumes. Boyd's does not suggest in his disclosure that mounting the cylinder assembly in a housing and substantially surrounding the cylinder assembly with a worked fluid processing volume would be germane to his concepts, which would need to be subsgtantially modified to read on claim 471. The remaining claims are dependent on claim 471 and accordingly lack the teaching of the citations.

> *To anticipate under 35 USC 102, a prior art reference must disclose each and every element of the claimed invention or their equivalents and the elements must function in substantially in the same way to produce substantially the same result. Identity of structure, purpose and result are required to make out anticipation. cf Tate Engineering vs United States 175 USPQ 115 and Penn Yan Boats vs Sealark Boats 175 USPQ 260.*

It is respectfully submitted that all the enabling requirements of 35 USC # 102(b) have been met and that all the rejections under this heading are herewith traversed.

Claim Rejections - 35 USC # 103(a)

BACKGROUND

Having recently read the examiner's and much other engine related prior art, the applicant is struck by the enormous differences between the conceptual world of the published material and the present disclosure. The latter is concerned with establishing a viable way to build high-performance un-cooled engines, largely from ceramic components, and designing round the problems presented by their hugely increased operating temperatures and pressures. All the features in the disclosure were conceived independently to resolve these problems, including eliminated the need for a wet lubrication between piston and cylinder by changing component layout to remove side thrust and introducing tghe options of air bearings and labyrinth sealing, designing the main components to suit the characteristics of ceramic materials by drastically reducing thermal gradients, moving any mechanical systems which might require wet lubrication out of the hot regions around and between combustion chambers. There is no suggestion in published art that the authors had any inkling of or interest in the issues which are the subject of the present disclosure. The applicant considers there is nothing obvious in his disclosure.

Over the last decades, the applicant has disclosed his ideas in confidence to a select number of individuals who had lifelong experience in the art of combustion engines. Absolutely without exception, all thought the disclosures entirely novel and original. Expert witnesses to this effect could be provided.

DETAILED RESPONSE

> *Claims 392, 423, 424, 426 are rejected as unpatentable over Dreisbach.*

Dreisbach discloses a quite different device to that of main claim 390, on which 392 depends, in that in his the piston does not reciprocate relative to the cylinder - see comments on rejection under 35 USC #.102(b).

Dreisbach's invention would have to be totally and radically modified to read on claim 390. The amendment to claim 390 further distinguishes over Dreisbach by reciting a volume surrounding the cylinder for passage of fluids worked by the device (as distinct from fluids not worked by the device and used for cooling). The remaining claims are dependent on claim 390 and accordingly lack the teaching of the citations.

Claims 394, 395, are rejected as unpatentable over Dreisbach in view of Waeber.

Argument is presented above that Dreisbach does not read on claim 390, on which 394 and 395 depend. In fact, Waeber refers to "an" (ie one) engine with multiple cylinder banks and crankshafts (see first lines of his disclosure). Claim 394 has been amended to further distinguish over Waeber.

Claims 509, 511, 530, 531, 540, 541, 542, 543, 544, 545 are rejected as unpatentable over Dreisbach in view of Nallinger.

Dreisbach discloses a different device to that of main claim 509, in that in his the piston does not reciprocate relative to the cylinder - see comments above. Dallinger discloses a device serving essentially to insulate sound (see his title), while the present disclosure is concerned with insulation to prevent heat loss. Claim 509 has been amended to clarify this. It is generally understood that the art, science and materials used in sound insulation are substantially different from those used in heat insulation.

Claims 390, 392, 396, 399, 409, 410 are rejected as unpatentable over Brown in view of Dreisbach.

In the examiner's action, a patent number for Brown seems to have been omitted The applicant assumes it is a previously cited patent, number 2 918 045. Browns device is (like Dreisbach's) one where the piston only reciprocates, whereas in main claim 390 the piston both reciprocates and rotates relative to the cylinder. Like Dreisbach's invention, it would have to be unrecognizably modified to read on claim 390, involving introduction of a means to convert reciprocating into combined motion sam as a cam sysgtem, eliminating upper valve and porting, eliminating the connecting rod, small end and big end bearings, crankshaft and crankcase. The remaining claims are dependent on claim 390 and accordingly lack the teaching of the citations.

Claims 400 - 403 are rejected as unpatentable over Brown in view of Dreisbach and Berger.

See comments above on how neither Brown nor of Dreisbach, nor the two in combination read on main claim 390, on which 400 -403 depend. There is no suggestion of teaching filamentary material in either case. Berger's disclosure is about exhaust gas pre-heating and temperature control, regulation of secondary air, and pre-ignition systems, subjects outside the scope of the emissions art of the present disclosure. Filamentary material has been in the prior art for over a century, is not novel or claimed as such by Berger. In the present application, it is claimed in combination with novel structure, in a special location.

Claims 404, 405, 509, 511, 528, 529, 548 are rejected as unpatentable over Brown in view of Dreisbach and Nallinger.

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See above comments above on how neither Brown nor of Dreisbach, nor the two in combination read on main claim 390, on which 404, 405 depend. Nallinger is about sound insulation, while the present disclosure refers to un-cooled engines and using insulation to prevent heat dissipation. Claims 404, 405, 509 have been amended to further make this distinction. See comments under rejection under 35 USC # 102(b) about the elements "pre-loaded in tension" of claims 528 and 529. The remaining claims are dependent on main claim 509 and accordingly lack the teaching of the citations.

Claims 406, 407, 413 - 416 are rejected as unpatentable over Dreisbach in view of Goldsborough.

As noted, Dreisbach does not read on main claim 390, and therefore not on its dependent claims. Goldsborough discloses a "refractory" lining over metal structures 12 and 28. This differs from the engine structures of the present disclosure, where main ceramic components are structural.

As background information, research in the '80's into adiabatic or reduced-cooling engines mostly involved work along the lines of putting ceramic caps on metal pistons, ceramic cylinder liners in metal engine blocks, etc, with poor results. Among other large problems was the substantially different co-efficients of expansion of ceramics and metals. Goldsborough's constructions may seem "obvious", but they are generally agreed not to work. In order to raise efficiencies significantly, temperatures have to be raised in greater proportion and, for that to work in practice, the reciprocating engine has to be totally reconfigured, which is the subject of the present disclosure.

In the foregoing claims, no novelty is claimed for ceramic materials or for electrical circuits in ceramics. In the present application, they are claimed in combination with novel structures, in special locations. These claims are dependent on main claim 390 and accordingly lack the teaching of the citations.

Claims 532 - 535 are rejected as unpatentable over Dreisbach in view of Nallinger and Goldsborough.

Dreisbach's piston does not reciprocate and rotate as called for in main claim 509 on which 532 -535 depend, Nallinger's invention relates exclusively to acoustic insulation, and Goldsborough shows known ceramic material used in engines quite differently from the manner of the disclosure. These claims are dependent on main claim 509 and accordingly lack the teaching of the citations.

Claims 471, 473, 478, 479, 480, 503 are rejected as unpatentable over Boyd.

Main claim 471 distinguishes over Boyd because it recites a cylinder assembly mounted in a housing, and, as modified, further distinguishes over Boyd by reciting a volume for passage of worked fluids substantially surrounding a cylinder assembly. There is nothing in Boyd which suggests teaching of these two important features. In fact, Boyd's device is quite different from the devices disclosed in the present application, since it shows a combined-motion piston threaded on a concentric rotating shaft. In the present disclosure, care been taken to locate any mechanical drive systems (that may need wet lubrication) out of the potentially hot zone within the space occupied by the fluid working chambers. All the above claims are dependent on main claim 471 and accordingly lack the teaching of the citations.

Claim 478 was never intended to read on an exhaust manifold; it has been amended to distinguish it further. Regarding claim 489, it is the applicant's understanding that it is the convention that patent definitions of structure do not usually consider molecular events or manufacturing imperfections. The claim has been modified to further distinguish over manufacturing imperfections and piston ring grooves.

Claims 475 and 476 are rejected as unpatentable over Boyd in view of Waeber.

As noted above, the main claim 471 (on which the rejected claims are dependent) has been amended to further distinguish over Boyd. Claim 475, on which 476 is dependent, has been modified to further distinguish over Waeber.

Claims 481 - 484 are rejected as unpatentable over Boyd in view of Berger.

Main claim 471 (on which the rejected claims are dependent) has been amended to further distinguish over Boyd. All these claims are dependent on main claim 471 and accordingly lack the teaching of the citations. Please note the comments above on filamentary material and Berger.

Claims 485, 509, 511, 515 - 518 are rejected as unpatentable over Boyd in view of Nallinger.

Main claims 471 (on which 485 is dependent) and 509 (on which 515 - 518 are dependent) have been amended to further distinguish over Boyd. Boyd does not read on either the original or amended main claims 471 and 509, since he does not give any indiction of a cylinder assembly mounted in a housing, nor of insulating material. These claims are dependent on main claim 471 or 509, and accordingly lack the teaching of the citations. Nallinger was exclusively concerned with acoustic insulation, as opposed to heat insulation. Claims 485 and 509 have been amended to further distinguish over Nallinger.

Claims 486 - 488, 494 - 497 are rejected as unpatentable over Boyd in view of Goldsborough.

Main claim 471 (on which the rejected claims are dependent) has been amended to further distinguish over Boyd. All these claims are dependent on main claim 471 and accordingly lack the teaching of the citations. Goldsborough discloses a "refactory" lining over metal structures 12 and 28. This differs from the engine structures of the present disclosure, where main ceramic components are structural. Please see the background note above.

In the foregoing claims, no novelty is claimed for ceramic materials or for electrical circuits in ceramics. In the present application, they are claimed in combination with novel structures, in special locations. These claims are dependent on main claim 390 and accordingly lack the teaching of the citations.

Claims 509, 511, 515 - 518 are rejected as unpatentable over Brown in view of Dreisbach and Nallinger.

All three citations describe devices wherein a piston only reciprocates in a cylinder, and in their disclosures there is no suggestion of a piston with combined motion relative to cylinder, nor a means to generate such motion, both described in main claim 509. The other claims depend on claim 509, and accordingly lack the

teaching of the citations. As noted above, Nallinger's disclosure is limited to acoustic insulation, not the heat-retaining insulation of the disclosure.

Claims 516 and 518 were never intended to read on an exhaust manifold; tghgey have been amended to distinguish them further. Regarding claim 527, it is the applicant's understanding that it is the convention that patent definitions of structure do not usually consider molecular events or manufacturing imperfections. The claim has been modified to further distinguish over manufacturing imperfections and piston ring grooves.

Claims 513, 514 are rejected as unpatentable over Brown in view of Dreisbach, Nallinger and Waeber.

See comments above on the combination of Brown, Dreisbach and Nallinger relating to claim 590, on which these claims depend; they lack the teaching of the citations. Waeber refers to "an" (ie one) engine with multiple cylinder banks and crankshafts (see first lines of his disclosure). Claims 513 and 514 have been amended to further distinguish over Waeber.

Claims 519 - 522 are rejected as unpatentable over Brown in view of Dreisbach, Nallinger and Berger.

See comments above on the combination of Brown, Dreisbach and Nallinger relating to claim 590, on which these claims depend; they lack the teaching of the citations. There is no suggestion of teaching filamentary material in any of the three cases. Berger's disclosure is about exhaust gas pre-heating and temperature control, regulation of secondary air, and pre-ignition systems, subjects outside the scope of the emissions art of the present disclosure. Filamentary material has been in the prior art for over a century, is not novel or claimed as such by Berger. In the present application, it is claimed in combination with novel structure, in a special location.

Claims 524 - 526 are rejected as unpatentable over Brown in view of Dreisbach, Nallinger and Goldsborough.

See comments above on the combination of Brown, Dreisbach and Nallinger relating to claim 590, on which these claims depend; they lack the teaching of the citations. Goldsborough discloses a "refractory" lining over metal structures 12 and 28. This differs from the engine structures of the present disclosure, where main ceramic components are structural. Please see the background note above.

In the foregoing claims, no novelty is claimed for ceramic materials or for electrical circuits in ceramics. In the present application, they are claimed in combination with novel structures, in special locations. These claims are dependent on main claim 390 and accordingly lack the teaching of the citations.

Apparatus cannot be rejected on a combination of elements allegedly drawn from prior art disclosures where elements must be modified to meet claims and where both the combination and the modifications must be made in the light of applicant's teachings rather than in the light of

suggestions derived from prior art. Walker vs Ladd, Comm. Pats., 138 USPQ 386.

It is respectfully submitted that all the enabling requirements of 35 USC # 102(b) have been met and that all the rejections under this heading are herewith traversed.

End of response.

In my application number ***08 /477 704*** *titled* ***"Reciprocating Elements and Associated Fluid Flows"*** *filed on June 7 1995 under group art 3747, WHAT I Mitja Victor Hinderks CLAIM IS:*

390. *(Thrice amended) A (rotatable shaft, a mechanism) and device for the working of fluids, said device comprising a housing with a cylinder assembly mounted therein, at least one component assembly mounted to reciprocate within said cylinder assembly, said cylinder assembly having at least one first working surface and said component assembly having at least one second working surface such that said working surfaces in operation are approximately parallel and co-axial and variably spaced, said surfaces partly defining at least one fluid working chamber varying in capacity during an operating cycle of said device, means deployed between said cylinder assembly and said component assembly to cause said component assembly and said second surface to rotate while reciprocating relative to said cylinder assembly and said first surface, (said component assembly being linked to said shaft by said mechanism, said mechanism causing said shaft to only rotate while said component assembly reciprocates and rotates.)* <u>*said device including structure which defines a volume substantially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device.*</u>

Figs 116 - 140.

Text p 37 ln 12 - p 47 ln 18.

391. *The device of claim 390, said cylinder assembly being rotatably mounted in said housing.*

Figs 116 - 140;

Text p 37 ln 12 - p 47 ln 18

392. *A reciprocating combustion engine, including a fuel delivery system, an exhaust emission control system and the device of claim 390.*

Figs 116 - 140; 149 - 280.

Text p 37 ln 12 - p 47 ln 18; p 49 ln 7 - p 80 ln 7.

393. *The engine of claim 392, said cylinder assembly being rotatably mounted in said housing.*

Figs 116 - 140; 149 - 280.

Text p 37 ln 12 - p 47 ln 18; p 49 ln 7 - p 80 ln 7.

394. *A compound engine comprising the engine of claim 392, at least one other engine* <u>*of another type*</u>*, and a (special)* <u>*second*</u> *means for transferring work between each of said at least two engines.*

Figs 4 - 13; 75 - 80.

Text p 8 ln 1 - p 10 ln 6; p24 ln 12 - end.

395. *The compound engine of claim 394, wherein said (special) second means include the flow of heated gases.*

Figs 4 - 13; 75 - 80.

Text p 8 ln 1 - p 10 ln 6; p24 ln 12 - end.

396. *The device of claim 390, wherein said component assembly defines a passage for fluids worked by said device.*

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

397. *Deleted.*

398. *The engine of claim 392, wherein said component assembly defines a passage for fluids worked by said device.*

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

399. *The (engine) device of claim (392) 390, (including structure which defines a volume at least partially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device) wherein said component assembly defines a passage for fluids worked by said device.*

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

400. *The engine of claim 398, including filamentary material within said passage.*

Figs 149 - 153; 171 - 228.

Text p 49 ln 7 - p53 end.

401. *The engine of claim (399) 392, including filamentary material within said volume.*

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

402. *The engine of claim 400, wherein said filamentary material is catalytic to expedite reactions*

between portions of the working fluids.

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

403. *The engine of claim 401, wherein said filamentary material is catalytic to expedite reactions between portions of the working fluids.*

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

404. *The device of claim 390, including insulating material at least partially encasing said device, for purpose of reducing heat loss from said fluid working chamber.*

Figs 20 and 21; 68 - 70; 77 - 80; 129 - 140.

Text p 11 ln 13 - end; p24 ln 22 - end; p41 ln 29 - p41 ln 18.

405. *The engine of claim 392, including insulating material at least partially encasing said engine, for purpose of reducing heat loss from said fluid working chamber.*

Figs 20 and 21; 68 - 70; 77 - 80; 129 - 140.

Text p 11 ln 13 - end; p24 ln 22 - end; p41 ln 29 - p41 ln 18.

406. *The device of claim 390, wherein said cylinder assembly is formed at least in part of ceramic material.*

Figs 1; 136 - 140.

Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.

407. *The device of claim 390, wherein said component assembly is formed at least in part of ceramic material.*

Figs 1; 136 - 140.

Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.

408. *The device of claim 390, wherein said component assembly has a first distinct surface and said cylinder assembly a second distinct surface, in operation said distinct surfaces being approximately constantly spaced from and approximately parallel to one another, at least one of said distinct surfaces defining at least one manufactured depression in operation wholly fillable by fluids worked by said device.*

Figs 71.

Text p 22 ln 31 - p 23 ln 5.

409. *The device of claim 390, wherein said cylinder assembly is comprised of portions including at least one element, each said element holding said portions together and being pre-loaded under tension.*

Figs 68 - 70; 78 and 79; 136 - 140.

Text p 25 ln 25 - end; p 43 ln 7 - p 47 ln 18.

410. *The device of claim 409, wherein said element is of tubular form.*

Figs 140.

Text p 45 ln 7 - p46 ln 27.

411. *The device of claim 390, wherein said component assembly is comprised of portions including at least one element, each said element holding said portions together and being pre-loaded under tension.*

Figs 136 - 140.

Text P 43 ln 7 - p 47 ln 18.

412. *The device of claim 411, wherein said element is of tubular form.*

Figs 140.

Text p 45 ln 7 - p46 ln 27.

413. *The engine of claim 392, wherein said cylinder assembly is formed at least in part of ceramic material.*

Figs 1; 136 - 140.

Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.

414. *The engine of claim 392, wherein said component assembly is formed at least in part of ceramic material.*

Figs 1; 136 - 140.

Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.

415. *The engine of claim 413, including at least one electrical circuit within said ceramic material.*

Figs 267.

Text p 7 ln 25 - end; p 77 ln 13 - ln 28.

416. *The engine of claim 414, including at least one electrical circuit within said ceramic material.*

Figs 267.

Text p 7 ln 25 - end; p 77 ln 13 - ln 28.

417. *The rotatable shaft, mechanism and device of claim (390) 552, in which said mechanism comprises a series of splines slidably mounted on another series of splines.*

Text p 33 ln 5 - 10.

418. *The rotatable shaft, mechanism and device of claim (390) 552 including rollers, in which said mechanism comprises a series of flanges slidably mounted on another series of flanges, said two series of flanges being separated by said rollers.*

Figs 103 and 104.

Text p 33 ln 5 - ln 15.

419. *The rotatable shaft, mechanism and device of claim (390) 552, wherein said mechanism comprises at least one bellows.*

Figs 107 and 108.

Text p 33 ln 5 - p 34 ln 4.

420. *The rotatable shaft, mechanism and device of claim (390) 552, wherein said mechanism comprises at least one hinged element.*

Figs 105 and 106.

Text p 33 ln 5 - p 34 ln 4.

421. *The device of claim 390, wherein said means comprise a guide restrained by a single endless substantially sinusoidal path.*

Figs 98 - 102; 109 - 116; 119 - 128.

Text p 30 ln 10 - p 33 ln 4; p 34 ln 5 - p 37 ln 24; p 38 ln 21 - p 41 ln 28.

422. *The device of claim 421, wherein said guide is a roller of truncated conical configuration.*

Figs 98 - 102; 109 - 116; 119 - 128.

Text p 30 ln 10 - p 33 ln 4; p 34 ln 5 - p 37 ln 24; p 38 ln 21 - p 41 ln 28.

423. *The engine of claim 392, wherein said means comprise a guide restrained by a single endless substantially sinusoidal path.*

Figs 98 - 102; 109 - 116; 119 - 128.

Text p 30 ln 10 - p 33 ln 4; p 34 ln 5 - p 37 ln 24; p 38 ln 21 - p 41 ln 28.

424. *The engine of claim 423, wherein said guide is a roller of truncated conical configuration.*

Figs 98 - 102; 109 - 116; 119 - 128.

Text p 30 ln 10 - p 33 ln 4; p 34 ln 5 - p 37 ln 24; p 38 ln 21 - p 41 ln 28.

425. *The device of claim 390, wherein said fluid working chamber is at least partially of toroidal configuration.*

Figs 20 and 21; 68 - 70; 77 - 80; 87 - 95; 116 - 140.

Text p 11 ln 13 - end; p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9; p37 ln 12 - p 47 ln 18.

426. *The engine of claim 392, wherein said fluid working chamber is at least partially of toroidal configuration*

Figs 20 and 21; 68 - 70; 77 - 80; 87 - 95; 116 - 140.

Text p 11 ln 13 - end; p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9; p37 ln 12 - p 47 ln 18.

427. *The engine of claim 393, wherein said housing comprises insulating material for purpose of reducing heat loss from said fluid working chamber.*

Figs 20 and 21; 68 - 70; 77 - 80; 129 - 140.

Text p 11 ln 13 - end; p 24 ln 22 - end; p 41 ln 29 - p 47 ln 18.

428. *The device of claim 390, wherein said component assembly consists of one monolithic piece.*

Figs 68 -70; 77 - 80; 87 -95.

Text p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9.

429. *The device of claim 390, wherein said component assembly has a projecting portion which at least partly penetrates (said segment) portion of said cylinder assembly during at least part of said cycle.*

Figs 68 -70; 77 - 80; 87 -95.

Text p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9.

430. *The engine of claim 392, wherein said component assembly has a projecting portion which at least partly penetrates (said segment) portion of said cylinder assembly during at least part of said cycle.*

Figs 68 -70; 77 - 80; 87 -95.

Text p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9.

431. *A rotatable shaft, a mechanism and device for the working of fluids, said device comprising a housing with a cylinder assembly mounted therein, at least one component assembly mounted to reciprocate within said cylinder assembly, said cylinder assembly having at least one first working*

surface and said component assembly having at least one second working surface such that said working surfaces in operation are approximately parallel and co-axial and variably spaced, said surfaces partly defining at least one fluid working chamber varying in capacity during an operating cycle of said device, means deployed between said cylinder assembly and said component assembly to cause said component assembly and said second surface to rotate while reciprocating relative to said cylinder assembly and said first surface, said component assembly being linked to said shaft by said mechanism, said mechanism causing said shaft to only rotate while said component assembly reciprocates and rotates, said cylinder assembly being rotatably mounted in said housing.

Figs 116 - 140.

Text p 37 ln 12 - p 47 ln 18.

432. *A reciprocating internal combustion engine, including a fuel delivery system, an exhaust emissions control system and the device of claim 431.*

Figs 116 - 140; 149 - 280.

Text p 37 ln 12 - p 47 ln 18; p 49 ln 7 - p 80 ln 7.

433. *A compound engine comprising the engine of claim 432, at least one other engine of another type, and a (special) second means for transferring work between each of said at least two engines.*

Figs 4 - 13; 75 - 80.

Text p 8 ln 1 - p 10 ln 6; p24 ln 12 - end.

434. *The compound engine of claim 433, wherein said (special) second means include the flow of heated gases.*

Figs 4 - 13; 75 - 80.

Text p 8 ln 1 - p 10 ln 6; p24 ln 12 - end.

435. *The device of claim 431, wherein said component assembly defines a passage for fluids worked by said device.*

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

436. *The device of claim 431, including structure which defines a volume (at least partially) substantially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device.*

437. *The engine of claim 432, wherein said component assembly defines a passage for fluids worked by*

said device.

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

438. *The engine of claim 432, including structure which defines a volume (at least partially) substantially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device.*

439. *The engine of claim 437, including filamentary material within said passage.*

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

440. *The engine of claim 438, including filamentary material within said volume.*

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

441. *The engine of claim 439, wherein said filamentary material is catalytic to expedite reactions between portions of the working fluids.*

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

442. *The engine of claim 440, wherein said filamentary material is catalytic to expedite reactions between portions of the working fluids.*

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

443. *The device of claim 431, including insulating material at least partially encasing said device, for purpose of reducing heat loss from said fluid working chamber.*

Figs 20 and 21; 68 - 70; 77 - 80; 129 - 140.

Text p 11 ln 13 - end; p24 ln 22 - end; p41 ln 29 - p41 ln 18.

444. *The engine of claim 432, including insulating material at least partially encasing said engine, for purpose of reducing heat loss from said fluid working chamber.*

Figs 20 and 21; 68 - 70; 77 - 80; 129 - 140.

Text p 11 ln 13 - end; p24 ln 22 - end; p41 ln 29 - p41 ln 18.

445. *The device of claim 431, wherein said cylinder assembly is formed at least in part of ceramic material.*

Figs 1; 136 - 140.

Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.

446. *The device of claim 431, wherein said component assembly is formed at least in part of ceramic material.*

Figs 1; 136 - 140.

Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.

447. *The device of claim 431, wherein said component assembly has a first distinct surface and said cylinder assembly a second distinct surface, in operation said distinct surfaces being approximately constantly spaced from and approximately parallel to one another, at least one of said distinct surfaces defining at least one manufactured depression in operation wholly fillable by fluids worked by said device.*

Figs 71.

Text p 22 ln 31 - p 23 ln 5.

448. *The device of claim 431, wherein said cylinder assembly is comprised of portions including at least one element, each said element holding said portions together and being pre-loaded under tension.*

Figs 68 - 70; 78 and 79; 136 - 140.

Text p 25 ln 25 - end; p 43 ln 7 - p 47 ln 18.

449. *The device of claim 448, wherein said element is of tubular form.*

Figs 140.

Text p 45 ln 7 - p46 ln 27.

450. *The device of claim 431, wherein said component assembly is comprised of portions including at least one element, each said element holding said portions together and being pre-loaded under tension.*

Figs 136 - 140.

Text P 43 ln 7 - p 47 ln 18.

451. *The device of claim 450, wherein said element is of tubular form.*

Figs 140.

Text p 45 ln 7 - p46 ln 27.

452. *The engine of claim 432, wherein said cylinder assembly is formed at least in part of ceramic material.*

Figs 1; 136 - 140.

Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.

453. *The engine of claim 432, wherein said component assembly is formed at least in part of ceramic material.*

Figs 1; 136 - 140.

Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.

454. *The engine of claim 452, including at least one electrical circuit within said ceramic material.*

Figs 267.

Text p 7 ln 25 - end; p 77 ln 13 - ln 28.

455. *The engine of claim 453, including at least one electrical circuit within said ceramic material.*

Figs 267.

Text p 7 ln 25 - end; p 77 ln 13 - ln 28.

456. *The rotatable shaft, mechanism and device of claim 431, in which said mechanism comprises a series of splines slidably mounted on another series of splines.*

Text p 33 ln 5 - 10.

457. *The rotatable shaft, mechanism and device of claim 431 including rollers, in which said mechanism comprises a series of flanges slidably mounted on another series of flanges, said two series of flanges being separated by said rollers.*

Figs 103 and 104.

Text p 33 ln 5 - ln 15.

458. *The rotatable shaft, mechanism and device of claim 431; wherein said mechanism comprises at least one bellows.*

Figs 107 and 108.

Text p 33 ln 5 - p 34 ln 4.

459. *The rotatable shaft, mechanism and device of claim 431, wherein said mechanism comprises at least one hinged element.*

Figs 105 and 106.

Text p 33 ln 5 - p 34 ln 4.

460. *The device of claim 431, wherein said means comprise a guide restrained by a single endless substantially sinusoidal path.*

Figs 98 - 102; 109 - 116; 119 - 128.

Text p 30 ln 10 - p 33 ln 4; p 34 ln 5 - p 37 ln 24; p 38 ln 21 - p 41 ln 28.

461. *The device of claim 460, wherein said guide is a roller of truncated conical configuration.*

Figs 98 - 102; 109 - 116; 119 - 128.

Text p 30 ln 10 - p 33 ln 4; p 34 ln 5 - p 37 ln 24; p 38 ln 21 - p 41 ln 28.

462. *The engine of claim 432, wherein said means comprise a guide restrained by a single endless substantially sinusoidal path.*

Figs 98 - 102; 109 - 116; 119 - 128.

Text p 30 ln 10 - p 33 ln 4; p 34 ln 5 - p 37 ln 24; p 38 ln 21 - p 41 ln 28.

463. *The engine of claim 462, wherein said guide is a roller of truncated conical configuration.*

Figs 98 - 102; 109 - 116; 119 - 128.

Text p 30 ln 10 - p 33 ln 4; p 34 ln 5 - p 37 ln 24; p 38 ln 21 - p 41 ln 28.

464. *The device of claim 431, wherein said fluid working chamber is at least partially of toroidal configuration.*

Figs 20 and 21; 68 - 70; 77 - 80; 87 - 95; 116 - 140.

Text p 11 ln 13 - end; p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9; p37 ln 12 - p 47 ln 18.

465. *The engine of claim 432, wherein said fluid working chamber is at least partially of toroidal configuration.*

Figs 20 and 21; 68 - 70; 77 - 80; 87 - 95; 116 - 140.

Text p 11 ln 13 - end; p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9; p37 ln 12 - p 47 ln 18.

466. *The device of claim 431, wherein said housing comprises insulating material <u>for purpose of reducing heat loss from said fluid working chamber.</u>*

Figs 20 and 21; 68 - 70; 77 - 80; 129 - 140.

Text p 11 ln 13 - end; p24 ln 22 - end; p41 ln 29 - p41 ln 18.

467. *The engine of claim 432, wherein said housing comprises insulating material <u>for purpose of reducing heat loss from said fluid working chamber.</u>*

Figs 20 and 21; 68 - 70; 77 - 80; 129 - 140.

Text p 11 ln 13 - end; p24 ln 22 - end; p41 ln 29 - p41 ln 18.

468. *The device of claim 431, wherein said component assembly consists of one monolithic piece.*

Figs 68 -70; 77 - 80; 87 -95.

Text p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9.

469. *The device of claim 431, wherein said component assembly has a projecting portion which at least partly penetrates (said segment) <u>portion of said cylinder assembly</u> during at least part of said cycle.*

Figs 68 -70; 77 - 80; 87 -95.

Text p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9.

470. *The engine of claim 432, wherein said component assembly has a projecting portion which at least partly penetrates (said segment) <u>portion of said cylinder assembly</u> during at least part of said cycle.*

Figs 68 -70; 77 - 80; 87 -95.

Text p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9.

471. *(Thrice amended) A (rotatable shaft, a mechanism and) device for the working of fluids, said device comprising a housing with a cylinder assembly mounted therein, at least one component assembly mounted to reciprocate within said cylinder assembly, said cylinder assembly having at least one working surface and said component assembly having at least one second working surface such that said working surfaces in operation are approximately parallel and co-axial and variably spaced, said surfaces partly defining at least one fluid working chamber varying in capacity during an operating cycle of said device, each of said surfaces being of endless wave-like configuration to permit and limit said component assembly and said second surface to both reciprocate and rotate relative to said cylinder assembly and said first surface, (said mechanism causing said shaft to only rotate while said component assembly reciprocates and rotates.) <u>said device including structure which defines a volume substantially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device.</u>*

Figs 98 - 102; 109 - 140.

Text p 30 ln 10 - p 33 ln 4; p 34 ln 5 - p 47 ln 18.

472. *The device of claim 471, said cylinder assembly being rotatably mounted in said housing.*

Figs 116 - 140; 149 - 280.
Text p 37 ln 12 - p 47 ln 18; p 49 ln 7 - p 80 ln 7.

473. *A reciprocating internal combustion engine, including a fuel delivery system, an exhaust emissions control system and the device of claim 471.*

Figs 116 - 140; 149 - 280.
Text p 37 ln 12 - p 47 ln 18; p 49 ln 7 - p 80 ln 7.

474. *The engine of claim 473, said cylinder assembly being rotatably mounted in said housing.*

Figs 116 - 140; 149 - 280.
Text p 37 ln 12 - p 47 ln 18; p 49 ln 7 - p 80 ln 7.

475. *A compound engine comprising the engine of claim 473, at least one other engine <u>of another type</u>, and a (special) <u>second</u> means for transferring work between each of said at least two engines.*

Figs 4 - 13; 75 - 80.
Text p 8 ln 1 - p 10 ln 6; p24 ln 12 - end.

476. *The compound engine of claim 475, wherein said (special) <u>second</u> means include the flow of heated gases.*

Figs 4 - 13; 75 - 80.
Text p 8 ln 1 - p 10 ln 6; p24 ln 12 - end.

477. *The device of claim 471, wherein said component assembly defines a passage for fluids worked by said device.*

Figs 68 -70; 90 - 95; 129 - 140
Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

478. *Deleted.*

479. *The engine of claim 473, wherein said component assembly defines a passage for fluids worked by said device.*

Figs 68 -70; 90 - 95; 129 - 140
Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

480. *The (engine) device of claim 471, (including structure which defines a volume at least partially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device.) wherein said component assembly defines a passage for fluids worked by said device.*

481. *The engine of claim (480) 479, including filamentary material within said passage.*

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

482. *The engine of claim (480) 473, including filamentary material within said volume.*

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

483. *The engine of claim 481, wherein said filamentary material is catalytic to expedite reactions between portions of the working fluids.*

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

484. *The engine of claim 482, wherein said filamentary material is catalytic to expedite reactions between portions of the working fluids.*

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

485. *The device of claim 471, including insulating material at least partially encasing said device for purpose of reducing heat loss from said fluid working chamber.*

Figs 20 and 21; 68 - 70; 77 - 80; 129 - 140.

Text p 11 ln 13 - end; p24 ln 22 - end; p41 ln 29 - p41 ln 18.

486. *The engine of claim 473, wherein said cylinder assembly is formed at least in part of ceramic material.*

Figs 1; 136 - 140.

Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.

487. *The device of claim 471, wherein said cylinder assembly is formed at least in part of ceramic material.*

Figs 1; 136 - 140.

Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.

488. *The device of claim 471, wherein said component assembly is formed at least in part of ceramic material.*

Figs 1; 136 - 140.

Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.

489. *The device of claim 471, wherein said component assembly has a first distinct surface and said cylinder assembly a second distinct surface, in operation said distinct surfaces being approximately constantly spaced from and approximately parallel to one another, at least one of said distinct surfaces defining at least one manufactured depression in operation wholly fillable by fluids worked by said device.*

Figs 71.

Text p 22 ln 31 - p 23 ln 5.

490. *The device of claim 471, wherein said cylinder assembly is comprised of portions including at least one element, each said element holding said portions together and being pre-loaded under tension.*

Figs 68 - 70; 78 and 79; 136 - 140.

Text p 25 ln 25 - end; p 43 ln 7 - p 47 ln 18.

491. *The device of claim 490, wherein said element is of tubular form.*

Figs 140.

Text p 45 ln 7 - p46 ln 27.

492. *The device of claim 471, wherein said component assembly is comprised of portions including at least one element, each said element holding said portions together and being pre-loaded under tension.*

Figs 136 - 140.

Text P 43 ln 7 - p 47 ln 18.

493. *The device of claim 492, wherein said element is of tubular form.*

Figs 140.

Text p 45 ln 7 - p46 ln 27.

494. *Deleted.*

495. The engine of claim 473, wherein said component assembly is formed at least in part of ceramic material.

Figs 1; 136 - 140.

Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.

496. The engine of claim 494, including at least one electrical circuit within said ceramic material.

Figs 267.

Text p 7 ln 25 - end; p 77 ln 13 - ln 28.

497. The engine of claim 495, including at least one electrical circuit within said ceramic material.

Figs 267.

Text p 7 ln 25 - end; p 77 ln 13 - ln 28.

498. The rotatable shaft, mechanism and device of claim (471) 553, in which said mechanism comprises a series of splines slidably mounted on another series of splines.

Text p 33 ln 5 - 10.

499. The rotatable shaft, mechanism and device of claim (471) 553 including rollers, in which said mechanism comprises a series of flanges slidably mounted on another series of flanges, said two series of flanges being separated by said rollers.

Figs 103 and 104.

Text p 33 ln 5 - ln 15.

500. The rotatable shaft, mechanism and device of claim (471) 553, wherein said mechanism comprises at least one bellows.

Figs 107 and 108.

Text p 33 ln 5 - p 34 ln 4.

501. The rotatable shaft, mechanism and device of claim (471) 553, wherein said mechanism comprises at least one hinged element.

Figs 105 and 106.

Text p 33 ln 5 - p 34 ln 4.

502. The device of claim 471, wherein said fluid working chamber is at least partially of toroidal configuration.

Figs 20 and 21; 68 - 70; 77 - 80; 87 - 95; 116 - 140.

Text p 11 ln 13 - end; p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9; p37 ln 12 - p 47 ln 18.

503. *The engine of claim 473, wherein said fluid working chamber is at least partially of toroidal configuration.*

Figs 20 and 21; 68 - 70; 77 - 80; 87 - 95; 116 - 140.

Text p 11 ln 13 - end; p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9; p37 ln 12 - p 47 ln 18.

504. *The device of claim 472, wherein said housing comprises insulating material for purpose of reducing heat loss from said fluid working chamber.*

Figs 20 and 21; 68 - 70; 77 - 80; 129 - 140.

Text p 11 ln 13 - end; p24 ln 22 - end; p41 ln 29 - p41 ln 18.

505. *The engine of claim 474, wherein said housing comprises insulating material for purpose of reducing heat loss from said fluid working chamber.*

Figs 20 and 21; 68 - 70; 77 - 80; 129 - 140.

Text p 11 ln 13 - end; p24 ln 22 - end; p41 ln 29 - p41 ln 18.

506. *The device of claim 471, wherein said component assembly consists of one monolithic piece.*

Figs 68 -70; 77 - 80; 87 -95.

Text p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9.

507. *The device of claim 471, wherein said component assembly has a projecting portion which at least partly penetrates (said segment) portion of said cylinder assembly during at least part of said cycle.*

508. *The engine of claim 473, wherein said component assembly has a projecting portion which at least partly penetrates (said segment) portion of said cylinder assembly during at least part of said cycle.*

509. *(Once amended) A (rotatable shaft, a mechanism and) device for the working of fluids, said device comprising a housing with a cylinder assembly mounted therein, at least one component mounted to reciprocate within said cylinder assembly, said cylinder assembly having at least one working surface and said component having at least one second working surface such that said working surfaces in operation are approximately parallel and co-axial and variably spaced, said surfaces partly defining at least one fluid working chamber varying in capacity during an operating*

cycle of said device, means deployed between said cylinder assembly and said component to cause said component and said second surface to rotate while reciprocating relative to said cylinder assembly and said first surface, (said mechanism causing said shaft to only rotate while said component assembly reciprocates and rotates,) said housing including substantial insulating material(.) for purpose of reducing heat loss from said fluid working chamber.

Figs 20 and 21; 68 - 70; 77 - 80; 116 - 140.

Text p 11 ln 13 - end; p 24 ln 22 - end; p 37 ln 12 - p 41 ln 18.

510. *The device of claim 509, said cylinder assembly being rotatably mounted in said housing.*

Figs 116 - 140.

Text p 37 ln 12 - p 47 ln 18.

511. *A reciprocating internal combustion engine, including a fuel delivery system, an exhaust emissions control system and the device of claim 509.*

Figs 116 - 140; 149 - 280.

Text p 37 ln 12 - p 47 ln 18; p 49 ln 7 - p 80 ln 7.

512. *The engine of claim 511, said cylinder assembly being rotatably mounted in said housing.*

Figs 116 - 140; 149 - 280.

Text p 37 ln 12 - p 47 ln 18; p 49 ln 7 - p 80 ln 7.

513. *A compound engine comprising the engine of claim 511, at least one other engine of another type, and a (special) second means for transferring work between each of said at least two engines.*

Figs 4 - 13; 75 - 80.

Text p 8 ln 1 - p 10 ln 6; p24 ln 12 - end.

514. *The compound engine of claim 513, wherein said (special) second means include the flow of heated gases.*

Figs 4 - 13; 75 - 80.

Text p 8 ln 1 - p 10 ln 6; p24 ln 12 - end.

515. *The device of claim 509, wherein said component assembly defines a passage for fluids worked by said device.*

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

516. *The device of claim 509, including structure which defines a volume (at least partially) substantially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device.*

517. *The engine of claim 511, wherein said component assembly defines a passage for fluids worked by said device.*

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

518. *The engine of claim 511, including structure which defines a volume (at least partially) substantially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device.*

519. *The engine of claim 517, including filamentary material within said passage.*

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

520. *The engine of claim 518, including filamentary material within said volume.*

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

521. *The engine of claim 519, wherein said filamentary material is catalytic to expedite reactions between elements of the working fluids.*

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

522. *The engine of claim 520, wherein said filamentary material is catalytic to expedite reactions between elements of the working fluids.*

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

523. *The (device) engine of claim (509) 511, including secondary insulating material at least partially encasing said device for purpose of reducing heat loss from said fluid working chamber.*

Figs 20 and 21; 68 - 70; 77 - 80; 129 - 140.

Text p 11 ln 13 - end; p24 ln 22 - end; p41 ln 29 - p41 ln 18.

524. *The engine of claim 511, wherein said cylinder assembly is formed at least in part of ceramic material.*

Figs 1; 136 - 140.

Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.

525. *The device of claim 509, wherein said cylinder assembly is formed at least in part of ceramic material.*

Figs 1; 136 - 140.

Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.

526. *The device of claim 509, wherein said component assembly is formed at least in part of ceramic material.*

Figs 1; 136 - 140.

Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.

527. *The device of claim 509, wherein said component assembly has a first distinct surface and said cylinder assembly a second distinct surface, in operation said distinct surfaces being approximately constantly spaced from and approximately parallel to one another, at least one of said distinct surfaces defining at least one manufactured depression in operation wholly fillable by fluids worked by said device.*

Figs 71.

Text p 22 ln 31 - p 23 ln 5.

528. *The device of claim 509, wherein said cylinder assembly is comprised of portions including at least one element, each said element holding said portions together and being pre-loaded under tension.*

Figs 68 - 70; 78 and 79; 136 - 140.

Text p 25 ln 25 - end; p 43 ln 7 - p 47 ln 18.

529. *The device of claim 528, wherein said element is of tubular form.*

Figs 140.

Text p 45 ln 7 - p46 ln 27.

530. *The device of claim 509, wherein said component assembly is comprised of portions including at least one element, each said element holding said portions together and being pre-loaded under tension.*

Figs 136 - 140.

Text P 43 ln 7 - p 47 ln 18.

531. The device of claim 530, wherein said element is of tubular form.

Figs 140.

Text p 45 ln 7 - p46 ln 27.

532. The engine of claim (511) 512, wherein said cylinder assembly is formed at least in part of ceramic material.

Figs 1; 136 - 140.

Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.

533. The engine of claim 511, wherein said component assembly is formed at least in part of ceramic material.

534. The engine of claim 532, including at least one electrical circuit within said ceramic material.

Figs 267.

Text p 7 ln 25 - end; p 77 ln 13 - ln 28.

535. The engine of claim 533, including at least one electrical circuit within said ceramic material.

Figs 267.

Text p 7 ln 25 - end; p 77 ln 13 - ln 28.

536. The rotatable shaft, mechanism and device of claim (509) 554, in which said mechanism comprises a series of splines slidably mounted on another series of splines.

Text p 33 ln 5 - 10.

537. The rotatable shaft, mechanism and device of claim (509) 554 including rollers, in which said mechanism comprises a series of flanges slidably mounted on another series of flanges, said two series of flanges being separated by said rollers.

Figs 103 and 104.

Text p 33 ln 5 - ln 15.

538. The rotatable shaft, mechanism and device of claim (509) 554, wherein said mechanism comprises at least one bellows.

Figs 107 and 108.

Text p 33 ln 5 - p 34 ln 4.

539. *The rotatable shaft, mechanism and device of claim (509) 554, wherein said mechanism comprises at least one hinged element.*

Figs 105 and 106.

Text p 33 ln 5 - p 34 ln 4.

540. *The device of claim 509, wherein said means comprise a guide restrained by a single endless substantially sinusoidal path.*

Figs 98 - 102; 109 - 116; 119 - 128.

Text p 30 ln 10 - p 33 ln 4; p 34 ln 5 - p 37 ln 24; p 38 ln 21 - p 41 ln 28.

541. *The device of claim 540, wherein said guide is a roller of truncated conical configuration.*

Figs 98 - 102; 109 - 116; 119 - 128.

Text p 30 ln 10 - p 33 ln 4; p 34 ln 5 - p 37 ln 24; p 38 ln 21 - p 41 ln 28.

542. *The engine of claim 511, wherein said means comprise a guide restrained by a single endless substantially sinusoidal path.*

Figs 98 - 102; 109 - 116; 119 - 128.

Text p 30 ln 10 - p 33 ln 4; p 34 ln 5 - p 37 ln 24; p 38 ln 21 - p 41 ln 28.

543. *The engine of claim 542, wherein said guide is a roller of truncated conical configuration.*

Figs 98 - 102; 109 - 116; 119 - 128.

Text p 30 ln 10 - p 33 ln 4; p 34 ln 5 - p 37 ln 24; p 38 ln 21 - p 41 ln 28.

544. *The device of claim 509, wherein said fluid working chamber is at least partially of toroidal configuration.*

Figs 20 and 21; 68 - 70; 77 - 80; 87 - 95; 116 - 140.

Text p 11 ln 13 - end; p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9; p37 ln 12 - p 47 ln 18.

545. *The engine of claim 511, wherein said fluid working chamber is at least partially of toroidal configuration.*

Figs 20 and 21; 68 - 70; 77 - 80; 87 - 95; 116 - 140.

Text p 11 ln 13 - end; p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9; p37 ln 12 - p 47 ln 18.

546. *The (device) engine of claim (510) 473, wherein said housing comprises insulating material for*

purpose of reducing heat loss from said fluid working chamber.

Figs 20 and 21; 68 - 70; 77 - 80; 129 - 140.

Text p 11 ln 13 - end; p24 ln 22 - end; p41 ln 29 - p41 ln 18.

547. *The engine of claim 512, (wherein said housing comprises insulating material.) including secondary insulating material at least partially encasing said device for purpose of reducing heat loss from said fluid working chamber.*

Figs 20 and 21; 68 - 70; 77 - 80; 129 - 140.

Text p 11 ln 13 - end; p24 ln 22 - end; p41 ln 29 - p41 ln 18.

548. *The device of claim 509, wherein said component assembly consists of one monolithic piece.*

Figs 68 -70; 77 - 80; 87 -95.

Text p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9.

549. *The device of claim 509, wherein said component assembly has a projecting portion which at least partly penetrates (said segment) portion of said cylinder assembly during at least part of said cycle.*

Figs 68 -70; 77 - 80; 87 -95.

Text p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9.

550. *The engine of claim 511, wherein said component assembly has a projecting portion which at least partly penetrates (said segment) portion of said cylinder assembly during at least part of said cycle.*

Figs 68 -70; 77 - 80; 87 -95.

Text p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9.

551. *The engine of claim 511, including structure which defines a volume substantially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device.*

552 *The device of claim 390 including a mechanism and a rotatable shaft, said shaft linked to said component assembly by said mechanism such that said shaft only rotates while said component assembly reciprocates and rotates.*

553 *The device of claim 471 including a mechanism and a rotatable shaft, said shaft linked to said component assembly by said mechanism such that said shaft only rotates while said component assembly reciprocates and rotates.*

554 *The device of claim 509 including a mechanism and a rotatable shaft, said shaft linked to said component assembly by said mechanism such that said shaft only rotates while said component assembly reciprocates and rotates.*

END OF CLAIMS

In my application number ***08 /477 704*** *titled* ***"Reciprocating Elements and Associated Fluid Flows"*** *filed on June 7 1995 under group art 3747, WHAT I Mitja Victor Hinderks CLAIM IS:*

390. *A device for the working of fluids, said device comprising a housing with a cylinder assembly mounted therein, at least one component assembly mounted to reciprocate within said cylinder assembly, said cylinder assembly having at least one first working surface and said component assembly having at least one second working surface such that said working surfaces in operation are approximately parallel and co-axial and variably spaced, said surfaces partly defining at least one fluid working chamber varying in capacity during an operating cycle of said device, means deployed between said cylinder assembly and said component assembly to cause said component assembly and said second surface to rotate while reciprocating relative to said cylinder assembly and said first surface, said device including structure which defines a volume substantially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device.*

391. *The device of claim 390, said cylinder assembly being rotatably mounted in said housing.*

392. *A reciprocating combustion engine, including a fuel delivery system, an exhaust emission control system and the device of claim 390.*

393. *The engine of claim 392, said cylinder assembly being rotatably mounted in said housing.*

394. *A compound engine comprising the engine of claim 392, at least one other engine of another type, and a second means for transferring work between each of said at least two engines.*

395. *The compound engine of claim 394, wherein said second means include the flow of heated gases.*

396. *The device of claim 390, wherein said component assembly defines a passage for fluids worked by said device.*

398. *The engine of claim 392, wherein said component assembly defines a passage for fluids worked by said device.*

399. *The device of claim 390, wherein said component assembly defines a passage for fluids worked by said device.*

400. *The engine of claim 398, including filamentary material within said passage.*

401. *The engine of claim 392, including filamentary material within said volume.*

402. *The engine of claim 400, wherein said filamentary material is catalytic to expedite reactions between portions of the working fluids.*

403. *The engine of claim 401, wherein said filamentary material is catalytic to expedite reactions between portions of the working fluids.*

404. *The device of claim 390, including insulating material at least partially encasing said device, for purpose of reducing heat loss from said fluid working chamber.*

405. *The engine of claim 392, including insulating material at least partially encasing said engine, for purpose of reducing heat loss from said fluid working chamber.*

406. *The device of claim 390, wherein said cylinder assembly is formed at least in part of ceramic material.*

407. *The device of claim 390, wherein said component assembly is formed at least in part of ceramic material.*

408. *The device of claim 390, wherein said component assembly has a first distinct surface and said cylinder assembly a second distinct surface, in operation said distinct surfaces being approximately constantly spaced from and approximately parallel to one another, at least one of said distinct surfaces defining at least one manufactured depression in operation wholly fillable by fluids worked by said device.*

409. *The device of claim 390, wherein said cylinder assembly is comprised of portions including at least one element, each said element holding said portions together and being pre-loaded under tension.*

410. *The device of claim 409, wherein said element is of tubular form.*

411. *The device of claim 390, wherein said component assembly is comprised of portions including at least one element, each said element holding said portions together and being pre-loaded under tension.*

412. *The device of claim 411, wherein said element is of tubular form.*

413. *The engine of claim 392, wherein said cylinder assembly is formed at least in part of ceramic material.*

414. *The engine of claim 392, wherein said component assembly is formed at least in part of ceramic material.*

415. *The engine of claim 413, including at least one electrical circuit within said ceramic material.*

416. *The engine of claim 414, including at least one electrical circuit within said ceramic material.*

417. *The rotatable shaft, mechanism and device of claim 552, in which said mechanism comprises a series of splines slidably mounted on another series of splines.*

418. *The rotatable shaft, mechanism and device of claim 552 including rollers, in which said mechanism comprises a series of flanges slidably mounted on another series of flanges, said two series of flanges being separated by said rollers.*

419. *The rotatable shaft, mechanism and device of claim 552, wherein said mechanism comprises at least one bellows.*

420. *The rotatable shaft, mechanism and device of claim 552, wherein said mechanism comprises at least one hinged element.*

421. *The device of claim 390, wherein said means comprise a guide restrained by a single endless substantially sinusoidal path.*

422. *The device of claim 421, wherein said guide is a roller of truncated conical configuration.*

423. *The engine of claim 392, wherein said means comprise a guide restrained by a single endless substantially sinusoidal path.*

424. *The engine of claim 423, wherein said guide is a roller of truncated conical configuration.*

425. *The device of claim 390, wherein said fluid working chamber is at least partially of toroidal configuration.*

426. *The engine of claim 392, wherein said fluid working chamber is at least partially of toroidal configuration*

427. *The engine of claim 393, wherein said housing comprises insulating material for purpose of reducing heat loss from said fluid working chamber.*

428. *The device of claim 390, wherein said component assembly consists of one monolithic piece.*

429. *The device of claim 390, wherein said component assembly has a projecting portion which at least partly penetrates portion of said cylinder assembly during at least part of said cycle.*

430. *The engine of claim 392, wherein said component assembly has a projecting portion which at least partly penetrates portion of said cylinder assembly during at least part of said cycle.*

431. *A rotatable shaft, a mechanism and device for the working of fluids, said device comprising a housing with a cylinder assembly mounted therein, at least one component assembly mounted to reciprocate within said cylinder assembly, said cylinder assembly having at least one first working surface and said component assembly having at least one second working surface such that said working surfaces in operation are approximately parallel and co-axial and variably spaced, said surfaces partly defining at least one fluid working chamber varying in capacity during an operating cycle of said device, means deployed between said cylinder assembly and said component assembly to cause said component assembly and said second surface to rotate while reciprocating relative to said cylinder assembly and said first surface, said component assembly being linked to said shaft by said mechanism, said mechanism causing said shaft to only rotate while said component assembly reciprocates and rotates, said cylinder assembly being rotatably mounted in said housing.*

432. *A reciprocating internal combustion engine, including a fuel delivery system, an exhaust emissions control system and the device of claim 431.*

433. *A compound engine comprising the engine of claim 432, at least one other engine of another type, and a second means for transferring work between each of said at least two engines.*

434. *The compound engine of claim 433, wherein said second means include the flow of heated gases.*

435. *The device of claim 431, wherein said component assembly defines a passage for fluids worked by said device.*

436. *The device of claim 431, including structure which defines a volume substantially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device.*

437. *The engine of claim 432, wherein said component assembly defines a passage for fluids worked by said device.*

438. *The engine of claim 432, including structure which defines a volume substantially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device.*

439. *The engine of claim 437, including filamentary material within said passage.*

440. *The engine of claim 438, including filamentary material within said volume.*

441. *The engine of claim 439, wherein said filamentary material is catalytic to expedite reactions between portions of the working fluids.*

442. *The engine of claim 440, wherein said filamentary material is catalytic to expedite reactions between portions of the working fluids.*

443. *The device of claim 431, including insulating material at least partially encasing said device, for purpose of reducing heat loss from said fluid working chamber.*

444. *The engine of claim 432, including insulating material at least partially encasing said engine, for purpose of reducing heat loss from said fluid working chamber.*

445. *The device of claim 431, wherein said cylinder assembly is formed at least in part of ceramic material.*

446. *The device of claim 431, wherein said component assembly is formed at least in part of ceramic*

material.

447. *The device of claim 431, wherein said component assembly has a first distinct surface and said cylinder assembly a second distinct surface, in operation said distinct surfaces being approximately constantly spaced from and approximately parallel to one another, at least one of said distinct surfaces defining at least one manufactured depression in operation wholly fillable by fluids worked by said device.*

448. *The device of claim 431, wherein said cylinder assembly is comprised of portions including at least one element, each said element holding said portions together and being pre-loaded under tension.*

449. *The device of claim 448, wherein said element is of tubular form.*

450. *The device of claim 431, wherein said component assembly is comprised of portions including at least one element, each said element holding said portions together and being pre-loaded under tension.*

451. *The device of claim 450, wherein said element is of tubular form.*

452. *The engine of claim 432, wherein said cylinder assembly is formed at least in part of ceramic material.*

453. *The engine of claim 432, wherein said component assembly is formed at least in part of ceramic material.*

454. *The engine of claim 452, including at least one electrical circuit within said ceramic material.*

455. *The engine of claim 453, including at least one electrical circuit within said ceramic material.*

456. *The rotatable shaft, mechanism and device of claim 431, in which said mechanism comprises a series of splines slidably mounted on another series of splines.*

457. *The rotatable shaft, mechanism and device of claim 431 including rollers, in which said mechanism comprises a series of flanges slidably mounted on another series of flanges, said two series of flanges being separated by said rollers.*

458. *The rotatable shaft, mechanism and device of claim 431, wherein said mechanism comprises at least one bellows.*

459. *The rotatable shaft, mechanism and device of claim 431, wherein said mechanism comprises at least one hinged element.*

460. *The device of claim 431, wherein said means comprise a guide restrained by a single endless substantially sinusoidal path.*

461. *The device of claim 460, wherein said guide is a roller of truncated conical configuration.*

462. *The engine of claim 432, wherein said means comprise a guide restrained by a single endless substantially sinusoidal path.*

463. *The engine of claim 462, wherein said guide is a roller of truncated conical configuration.*

464. *The device of claim 431, wherein said fluid working chamber is at least partially of toroidal configuration.*

465. *The engine of claim 432, wherein said fluid working chamber is at least partially of toroidal configuration.*

466. *The device of claim 431, wherein said housing comprises insulating material for purpose of reducing heat loss from said fluid working chamber.*

467. *The engine of claim 432, wherein said housing comprises insulating material for purpose of reducing heat loss from said fluid working chamber.*

468. *The device of claim 431, wherein said component assembly consists of one monolithic piece.*

469. *The device of claim 431, wherein said component assembly has a projecting portion which at least partly penetrates portion of said cylinder assembly during at least part of said cycle.*

470. *The engine of claim 432, wherein said component assembly has a projecting portion which at least partly penetrates portion of said cylinder assembly during at least part of said cycle.*

471. (Thrice amended) A (rotatable shaft, a mechanism and) device for the working of fluids, said device comprising a housing with a cylinder assembly mounted therein, at least one component assembly mounted to reciprocate within said cylinder assembly, said cylinder assembly having at least one working surface and said component assembly having at least one second working surface such that said working surfaces in operation are approximately parallel and co-axial and variably spaced, said surfaces partly defining at least one fluid working chamber varying in capacity during an operating cycle of said device, each of said surfaces being of endless wave-like configuration to permit and limit said component assembly and said second surface to both reciprocate and rotate relative to said cylinder assembly and said first surface, said device including structure which defines a volume substantially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device.

472. The device of claim 471, said cylinder assembly being rotatably mounted in said housing.

473. A reciprocating internal combustion engine, including a fuel delivery system, an exhaust emissions control system and the device of claim 471.

474. The engine of claim 473, said cylinder assembly being rotatably mounted in said housing.

475. A compound engine comprising the engine of claim 473, at least one other engine of another type, and a second means for transferring work between each of said at least two engines.

476. The compound engine of claim 475, wherein said second means include the flow of heated gases.

477. The device of claim 471, wherein said component assembly defines a passage for fluids worked by said device.

478. Deleted.

479. The engine of claim 473, wherein said component assembly defines a passage for fluids worked by said device.

480. The device of claim 471, wherein said component assembly defines a passage for fluids worked by said device.

481. The engine of claim 480, including filamentary material within said passage.

482. *The engine of claim 473, including filamentary material within said volume.*

483. *The engine of claim 481, wherein said filamentary material is catalytic to expedite reactions between portions of the working fluids.*

484. *The engine of claim 482, wherein said filamentary material is catalytic to expedite reactions between portions of the working fluids.*

485. *The device of claim 471, including insulating material at least partially encasing said device for purpose of reducing heat loss from said fluid working chamber.*

486. *The engine of claim 473, wherein said cylinder assembly is formed at least in part of ceramic material.*

487. *The device of claim 471, wherein said cylinder assembly is formed at least in part of ceramic material.*

488. *The device of claim 471, wherein said component assembly is formed at least in part of ceramic material.*

489. *The device of claim 471, wherein said component assembly has a first distinct surface and said cylinder assembly a second distinct surface, in operation said distinct surfaces being approximately constantly spaced from and approximately parallel to one another, at least one of said distinct surfaces defining at least one manufactured depression in operation wholly fillable by fluids worked by said device.*

490. *The device of claim 471, wherein said cylinder assembly is comprised of portions including at least one element, each said element holding said portions together and being pre-loaded under tension.*

491. *The device of claim 490, wherein said element is of tubular form.*

492. *The device of claim 471, wherein said component assembly is comprised of portions including at least one element, each said element holding said portions together and being pre-loaded under tension.*

493. *The device of claim 492, wherein said element is of tubular form.*

494. Deleted.

495. The engine of claim 473, wherein said component assembly is formed at least in part of ceramic material.

496. The engine of claim 494, including at least one electrical circuit within said ceramic material.

497. The engine of claim 495, including at least one electrical circuit within said ceramic material.

498. The rotatable shaft, mechanism and device of claim 553, in which said mechanism comprises a series of splines slidably mounted on another series of splines.

499. The rotatable shaft, mechanism and device of claim 553 including rollers, in which said mechanism comprises a series of flanges slidably mounted on another series of flanges, said two series of flanges being separated by said rollers.

500. The rotatable shaft, mechanism and device of claim 553, wherein said mechanism comprises at least one bellows.

501. The rotatable shaft, mechanism and device of claim 553, wherein said mechanism comprises at least one hinged element.

502. The device of claim 471, wherein said fluid working chamber is at least partially of toroidal configuration.

503. The engine of claim 473, wherein said fluid working chamber is at least partially of toroidal configuration.

504. The device of claim 472, wherein said housing comprises insulating material for purpose of reducing heat loss from said fluid working chamber.

505. The engine of claim 474, wherein said housing comprises insulating material for purpose of reducing heat loss from said fluid working chamber.

506. The device of claim 471, wherein said component assembly consists of one monolithic piece.

507. The device of claim 471, wherein said component assembly has a projecting portion which at least partly penetrates portion of said cylinder assembly during at least part of said cycle.

508. The engine of claim 473, wherein said component assembly has a projecting portion which at least partly penetrates portion of said cylinder assembly during at least part of said cycle.

509. A device for the working of fluids, said device comprising a housing with a cylinder assembly mounted therein, at least one component mounted to reciprocate within said cylinder assembly, said cylinder assembly having at least one working surface and said component having at least one second working surface such that said working surfaces in operation are approximately parallel and co-axial and variably spaced, said surfaces partly defining at least one fluid working chamber varying in capacity during an operating cycle of said device, means deployed between said cylinder assembly and said component to cause said component and said second surface to rotate while reciprocating relative to said cylinder assembly and said first surface, said housing including substantial insulating material for purpose of reducing heat loss from said fluid working chamber.

510. The device of claim 509, said cylinder assembly being rotatably mounted in said housing.

511. A reciprocating internal combustion engine, including a fuel delivery system, an exhaust emissions control system and the device of claim 509.

512. The engine of claim 511, said cylinder assembly being rotatably mounted in said housing.

513. A compound engine comprising the engine of claim 511, at least one other engine of another type, and a second means for transferring work between each of said at least two engines.

514. The compound engine of claim 513, wherein said second means include the flow of heated gases.

515. The device of claim 509, wherein said component assembly defines a passage for fluids worked by said device.

516. The device of claim 509, including structure which defines a volume substantially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device.

517. The engine of claim 511, wherein said component assembly defines a passage for fluids worked by

said device.

518. *The engine of claim 511, including structure which defines a volume substantially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device.*

519. *The engine of claim 517, including filamentary material within said passage.*

520. *The engine of claim 518, including filamentary material within said volume.*

521. *The engine of claim 519, wherein said filamentary material is catalytic to expedite reactions between elements of the working fluids.*

522. *The engine of claim 520, wherein said filamentary material is catalytic to expedite reactions between elements of the working fluids.*

523. *The engine of claim 511, including secondary insulating material at least partially encasing said device for purpose of reducing heat loss from said fluid working chamber.*

524. *The engine of claim 511, wherein said cylinder assembly is formed at least in part of ceramic material.*

525. *The device of claim 509, wherein said cylinder assembly is formed at least in part of ceramic material.*

526. *The device of claim 509, wherein said component assembly is formed at least in part of ceramic material.*

527. *The device of claim 509, wherein said component assembly has a first distinct surface and said cylinder assembly a second distinct surface, in operation said distinct surfaces being approximately constantly spaced from and approximately parallel to one another, at least one of said distinct surfaces defining at least one manufactured depression in operation wholly fillable by fluids worked by said device.*

528. *The device of claim 509, wherein said cylinder assembly is comprised of portions including at least one element, each said element holding said portions together and being pre-loaded under tension.*

529. The device of claim 528, wherein said element is of tubular form.

530. The device of claim 509, wherein said component assembly is comprised of portions including at least one element, each said element holding said portions together and being pre-loaded under tension.

531. The device of claim 530, wherein said element is of tubular form.

532. The engine of claim 512, wherein said cylinder assembly is formed at least in part of ceramic material.

533. The engine of claim 511, wherein said component assembly is formed at least in part of ceramic material.

534. The engine of claim 532, including at least one electrical circuit within said ceramic material.

535. The engine of claim 533, including at least one electrical circuit within said ceramic material.

536. The rotatable shaft, mechanism and device of claim 554, in which said mechanism comprises a series of splines slidably mounted on another series of splines.

537. The rotatable shaft, mechanism and device of claim 554 including rollers, in which said mechanism comprises a series of flanges slidably mounted on another series of flanges, said two series of flanges being separated by said rollers.

538. The rotatable shaft, mechanism and device of claim 554, wherein said mechanism comprises at least one bellows.

539. The rotatable shaft, mechanism and device of claim 554, wherein said mechanism comprises at least one hinged element.

540. The device of claim 509, wherein said means comprise a guide restrained by a single endless substantially sinusoidal path.

541. The device of claim 540, wherein said guide is a roller of truncated conical configuration.

542. *The engine of claim 511, wherein said means comprise a guide restrained by a single endless substantially sinusoidal path.*

543. *The engine of claim 542, wherein said guide is a roller of truncated conical configuration.*

544. *The device of claim 509, wherein said fluid working chamber is at least partially of toroidal configuration.*

545. *The engine of claim 511, wherein said fluid working chamber is at least partially of toroidal configuration.*

546. *The engine of claim 473, wherein said housing comprises insulating material for purpose of reducing heat loss from said fluid working chamber.*

547. *The engine of claim 512, including secondary insulating material at least partially encasing said device for purpose of reducing heat loss from said fluid working chamber.*

548. *The device of claim 509, wherein said component assembly consists of one monolithic piece.*

549. *The device of claim 509, wherein said component assembly has a projecting portion which at least partly penetrates portion of said cylinder assembly during at least part of said cycle.*

550. *The engine of claim 511, wherein said component assembly has a projecting portion which at least partly penetrates portion of said cylinder assembly during at least part of said cycle.*

551. *The engine of claim 511, including structure which defines a volume substantially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device.*

552 *The device of claim 390 including a mechanism and a rotatable shaft, said shaft linked to said component assembly by said mechanism such that said shaft only rotates while said component assembly reciprocates and rotates.*

553 *The device of claim 471 including a mechanism and a rotatable shaft, said shaft linked to said component assembly by said mechanism such that said shaft only rotates while said component assembly reciprocates and rotates.*

554 *The device of claim 509 including a mechanism and a rotatable shaft, said shaft linked to said component assembly by said mechanism such that said shaft only rotates while said component assembly reciprocates and rotates.*

END OF CLAIMS